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PID/ABCB 129/63
13 June 1963

MEMORANDUM FOR: Chief, Atomic/Biological/Chemical Division, OSI

25X1 ATTENTION: [redacted]

FROM: Chief, CIA/PID(NPIC)

SUBJECT: Mining and Prospecting Activities in the Wengyuan Region, Kwangtung Province, China

REFERENCES: Requirement No. OSI/R-216/62
CIA Project No. C 904-62
Requirement No. OSI/R-19/63
CIA Project No. C 90-63

1. The mountainous region for a radius of 50 nautical miles (nm) around the small country town of Weng-yuan, Kwangtung Province, China, was searched on fair to good quality photography for the location of uranium mines and any other possible evidences of atomic energy activity.

2. Four localities are suggested, from the photography, as possible sources of uranium ores and by-product concentrates (see Appendix I of this report for additional data on these sources or mines):

A. Panchi, or Mine 9, 24-35N 114-13E, which has been reported by an unverified or untested source to be an uranium mine. The source's description has been partially confirmed by photography. At Panchi the veins trend or strike N42W, unlike the tungsten veins of the Weng-yuan region which strike or trend in a more or less east-west direction. A study of the photography of mines shows the northwest-southeast trending veins are wide-spread in their occurrence, that they are closely related (though probably later) in geological age to the tungsten mineralization, and that they probably all have more or less the same mineral content. Using the northwest-southeast vein system as a clue, other localities are suggested as possible producers of uranium ores and concentrates.

B. Hsiao-chi, Mine 3, at 24-38N 114-15E and Hu-tzu, Mine 5, at 24-37N 114-15E, which form one extensive mining district. The irregular surface workings and underground mining make it difficult to estimate accurately the proportion of ore contributed by the two sets of veins.

C. Tien-tang-shan, Mine 13, at 24-26N 113-16E, is observed to have controlled access and to be working veins trending N7E to N29W even more extensively than a WNW-ESE vein system, under the difficult conditions of mountain top mining.

D. Huang-sha-k'eng, Prospect 2 (see Appendix II) 24-27N 113-08E, whose veins trending N17W to N44W, have been extensively trenched. Presumably some uranium or other rare mineral fractions are separated from tungsten ores at a number of other mines in small quantities.

3. Fifteen mines, in addition to four open pit iron ore or iron sulfide (pyrite) mines, have been identified from photography of the greater Weng-yuan region. A table listing the essential data pertaining to fifteen of these mines is appended hereto as Appendix I.

4. The Hsiao-chi and Hu-tzu mine areas are seen to represent a new and rapidly developing mine and mill district. As discussed in paragraph 2, the parallelism of the strike or trend of the trenches in these mine areas with those at a suspect uranium mine (No. 9) at Panchi, suggests that in addition to tungsten this area may also be producing uranium bearing ores. The prediction of the U.S. Geological Survey study "Uranium and Thorium Resources of China and North Korea", Binder 1, p. 95, Jan 1955, SECRET, "...lithium mica and perhaps even beryl could be recovered from some veins and greisen (fault) zones if large scale milling operations are undertaken," warrents the maintenance of a watch on the development of these areas. Old Chinese reports indicate that minor amounts of beryllium, bismuth, molybdenum, and fluorine bearing minerals are associated with these tungsten deposits, quite possibly in sufficient quantities to attract Chinese and Russian interest. Chinese patience, abundant manpower from the mining and nearby villages, could separate these minerals by laborious hand methods in simple structures.

5. Some of the mine dumps, particularly those at Mine 6, Kung-wu (24-27N 113-04E) and Mine 15, Wang-lung-kang (24-26N 113-03E), appear to have been reworked on a small and limited scale. At Mine 14, Tun-tzu-tou (Pa-pao-shan) (24-24N 113-07E) the mill tailings are observed to be passed over sluices in a gulch below the mill for recovery of mill discards.

6. Small active up-grading mills, probably using mechanical processes are to be seen at Mine 3 (Hsiao-chi), Mine 5 (Hu-tzu), and Mine 9 (Panchi), where uranium bearing ores might be given a low or preliminary concentration. Uranium bearing fractions produced in the western part of the Weng-yuan region by prospecting or as the by-product of tungsten ore concentration, could be treated as a part of a clean-up campaign in the tungsten ore mill at Tun-tzu-tou (Pa-pao-shan) at

24-24N 113-07E. Uranium bearing fractions from the east-central part of the Weng-yuan region could be treated at the mill at Huang-tung, 24-29N 113-58E, or trucked across the mountains to the large tungsten mill at Chang-kuang-ying, at 24-36N 114-22E, for further concentration. The small quantity of ores from Mine 13, (Tien-tang-shan), are trucked down the mountain to a walled shipment point at Lou-hsia, at 24-23N 113-19E whence they are shipped by mine railway to a loading spur on the standard gauge railway south of Fan-ch'ien at 24-21N 113-29E, 14 nm SSW of Wu-shih, to an undisclosed destination.

7. One may assume that enriched uranium ores may occur near the surface, perhaps averaging 0.20 percent (%) U_3O_8 equivalent. If, as mineralogically seems more likely, the U_3O_8 content will decrease as mining continues downward into the unenriched vein in 3 to 5 years, an average U_3O_8 content of 0.10% seems more reasonable. The following table attempts to break down the production of U_3O_8 by principal sources:

Table 1: Estimated Tentative Production of U_3O_8 in Metric Tons, Equivalent, 1962, For The Greater Weng-yuan Region, China

Mine No.	Name	Coordinates	Production, Metric Tons, U_3O_8 Equivalent	
			0.10% U_3O_8 Content	0.15% U_3O_8 Content
3	Hsiao-chi	24-38N 114-15E	100	150
5	Hu-tzu	24-37N 114-37E		
9	Panchi	24-35N 114-13E	15	23
13	Tien-tang-shan & other mines	24-26N 113-16E	20	24
--	Prospecting	--	15	23
TOTALS			150	220

8. Weng-yuan is seen to be a "small country town" without a mine, concentration plant, supply base, or apparent headquarters of a mining administration. Weng-yuan may have been used as a communications office because it is in the center of the new and westward extension of tungsten deposits of the adjoining southern Kiangsi Province. Weng-yuan is also in the center of extensive military facilities and would be expected to have a communications facility with procedures for safe-guarding messages. It has long been an administrative center for mining in northern Kwang-tung Province, being known as Wung-yuan in the pre-World War II mineral reports. Another Weng-yuan, named as New Weng-yuan

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or Niu-kang-tung (24-21N 114-07E) is seen to be another "small country town" without an ore treatment plant.

9. A draft map, on US Air Target Charts, Series 200, showing the locations of all prospects, their probable trend or strike of the veins has been prepared together with a brief description of the nature of the prospecting activity for the region having a radius of 50 nm around Weng-yuan. The draft map and explanatory text are on file in the Atomic/Biological/Chemical Branch where they may be consulted.

10. References used in the preparation of this memorandum are as follows: 25X1

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Collateral References:

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1. [redacted] 4 pages, info. Sept. 1959, issued 15 Oct 62, Confidential. Eval. 3. This is the only report from this source.

2. Hsiu, K.C. and Ting, I. Geology and Tungsten Deposits of Southern Kiangsi: Geological Survey of China, Memoir Series A, No. 17, 1943. Unclassified. Chinese and English texts. Colored geological map. Report also includes a portion of the northeastern part of Kwangtung Province and the eastern part of the greater Weng-yuan region.

Map Data:

USATC, Series 200, 498-16A, scale 1:200,000, April 1959, Secret.
USATC, Series 200, 498-17A, scale 1:200,000, April 1959, Secret.
USATC, Series 200, 498-21HL, scale 1:200,000, March 1962, Secret.
USATC, Series 200, 498-22AL, scale 1:200,000, Sept 1960, Secret.
USATC, Series 200, 614-1A, scale 1:200,000, April 1959, Secret.
USATC, Series 200, 614-2A, scale 1:200,000, Nov 1959, Secret.

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For place names see also:

AMS, Series L500, NF 49-4, Kuang-chou mapsheet, scale 1:250,000, Dec 1960, Unclassified.
AMS, Series L500, NG 49-16, Ch'u-chiang mapsheet, scale 1:250,000, April 1959, Unclassified.
AMS, Series L500, NG-50-9, Kan-hsien mapsheet, scale 1:250,000, April 1959, Unclassified.
AMS, Series L500, NG 50-13, Lung-ch'uan mapsheet, scale 1:250,000, April 1955, Unclassified.

11. This memorandum answers the referenced requirements and the projects are considered complete. The photo analysts on this project are Messrs. [redacted] They may be contacted on extension [redacted] should you have further questions regarding this project.

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APPENDIX I

Mines of the Greater Weng-yuan Region, Kwangtung Province, China

No.	Name	Coord-inates	Poss. Trend of Veins (Strike)	Distance, NM, airline from Weng-yuan	Prosp. Area	Access Route	Access to ore Deposit	Expl.-ives Dump	Mill	Housing Area
1	Chiang Tsao	24-42N 114-09E	N67W	27 NE	Yes	Trail	Open pits	---	3 small bldgs.	Yes
2	Chung-tsun	24-43E 114-04E	N50E	25 NE	Yes	Poor road	Tunnels shafts(?)	Yes	Yes	16 bldgs.
3	Hsiao-chi	24-38N 114-15E	N35W	28 NE	Yes	Good road	Open Pits tunnels	Yes	Yes	50 bldgs.
4	Huang-tung	24-29N 113-58E	N85E	10 NE	Yes	Good road	Open Pits tunnels	Yes	Yes	Yes
5	Hu-tzu	24 -37N 114-15E	N32W N64W	28 NE	Yes	Good road	Open Pits tunnel	No	Yes	5 bldgs.
6	Kung-wu	24-27N 113-03E	N90E	43 W trenches	20-30	Trail	Open pit	No	No	No
7	Kuo-lu-shan	24-42N 114-08E	N77W	27 NE	No	Trail	Open pits	--	--	--
8	Lao-ku-keng	24-43N 114-06E	N82E	27 NE	12 trenches	Trail	Open pit	--	No	19 bldgs.
9	Panchi	24-35N 114-13E	N42W	25 NE	20-25 trenches	Good road	Open Pit tunnels	No	Sorting plant	Village
10	Shan-men	25-02N 114-17E	N90E	46 NE	Yes	Poor road	Shaft(?) Open Pit	No(?)	3 small bldgs.	3 bldgs.
11	Shang-hsieh*	24-32N 113-47E	N15W	10N	Yes	Trail	Open pits Tunnels	No	Poss. mill	village
12	Sung-yuan	24-03N 114-14E	N50E	30 SE	6-8 trenches	Poor road	Open pits	No	No	4 bldgs.
13	Tien-tang-shan	24-26N 113-16E	N74E N7E to N29W	30 WNW	Pits	Trail	Open pits	No	No	sml. villag
14	Tun-Tzu-Tou	24-24N 113-07E	N73W N20E	38 W	Yes	Poor road	Open Pit tunnel	No(?)	Yes	sml. town
15	Wang-lung-	24-26N 113-02E	N85E	44W	12 trenches	Trail	Tunnel Open pits	No	No	Yes(?)

* Shang-hsieh is seen to be an old and rather inactive area. There is some doubt if this is a tungsten mine. Production of mineral concentrates is considered to be small.

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Prospecting is seen on photography to be carried out by digging narrow trenches along (rather than across) a vein. The richer parts may be drilled by pole drilling to shallow depths, as seen as Prospect 6. All prospects are unsecured. Prospects are usually trail served. The intersections of two veins or vein systems characterizes all mining districts and may be used as an indicator of the loci of the more favorable prospects. Many more prospects have been trenched or drilled than have been developed into mines.

If the China National Intelligence Survey estimates, Chapter 6, Section 63, p. 63-68, are correct for the 1935 reserves of 143,000 tons of tungstic oxide, it may be concluded from photography of the mine dumps that the deposits would now be approaching exhaustion. The extensive prospecting campaign has also probably been carried out also with the hope of finding new and perhaps richer deposits of accessory minerals, including those of possible interest to the Chinese atomic energy program.

If the strike or trend of the veins of both the prospects and the mines as seen on photography are plotted on a map the impression is obtained that there is a zoning laterally and vertically of the mineralization of the greater Weng-yuan region. The tungsten and rare mineral ore bodies are confined to veins on a possible eroded structural type of granite "dome". The central core of the Weng-yuan region is observed to have large irregular ore bodies of iron sulfide (pyrite) in a valley west and northwest of Yeng-te (24-11'N 113-25E). The iron sulfide deposits are seen to be surrounded both laterally and vertically by a zone of tungsten and rare mineral (uranium) veins. The latter strike or trend NW-SE and appear to be slightly later but belonging to the same regional age of mineralization. The latter are seen to occur generally in the upper slopes or peaks of the mountains. If this zonation is true it can be used to predict the location of future prospects and to check the reports of informants. The zonation also suggests that the tungsten deposits were formed under conditions of fairly high pressures and temperatures and that the primary uranium ore minerals are uraninite and pitchblende.

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APPENDIX II

Selected Most Promising Prospects of the Greater Weng-yuan Region, China

No.	Name	Coord-inates	Poss. Trend of Veins (Strike)	Distance, NM, air-line from Weng-yuan	Access Route	Remarks
1	Kou-erh-shan	24-28N 113-04E	N-S N75E	41 WNW	Trail	4 old trenches. 6 new pits to NW dug down to protore
2	Huang-sha-k'eng	24-27N 113-08E	N44W N17W	37 WNW	Poor road	Pits and trenches. 32 bldgs., housing area. Best of prospects
3	Fen-p'ing	24-26N 113-07E	N7W	38 WNW	Poor road	Pits and trenches. No scarring of a scarp
4	K'eng-wei	24-25N 113-17E	N9W N71E	28 WNW	Trail	3 trenches. ENE-WSW trenches most productive of a dark ore. 10 shacks Center of 3 related areas.
5	Hsi-an	24-28N 113-23E	N46E N8E	39 NW	Trail	16 recent trenches in 4 adjoining areas
6	Fu-hsing-tung	24-08N 114-02E	N64E	18 SE	Trail	8 recent intersecting trenches, 1 being drilled. A rejuvenated prspt.
7	Shang-wei	23-45N 113-47E	N51W N42E	37 SSW	Trail	7 intersecting trenches showing recently renewed digging.

Fourteen of the fifteen mines listed in the table above, as seen on photography, are considered to be working on tungsten deposits and to produce uranium, if at all, only as a small by-product operation:

(1) the U.S. Geo-Survey Study "Uranium and Thorium Resources of China and North Korea," Binder 1, p. 95, Jan 1955, states: "...it is unlikely that enough uranium is present in any deposit to constitute a worthwhile product."

(2) No uranium minerals were described by Chinese mineralogists just at a time prior to World War II when the significance of uranium was becoming recognized.

(3) The strike or trend of the veins, as shown in the table above, is generally nearly east-west across a broad region, making for a similarity of the ore deposits and of the mines themselves. The mines are seen to be with two exceptions (an old and a new mine area) uniformly small and simple with the buildings resembling each other.

(4) No special security fences and gates are seen about the properties, other than those customarily used to guard industrial property or explosive magazines.

(5) No large dumps indicative of the extraction of a minute constitutent in the ores are visible anywhere.

(6) No central uranium mill, with reagent tanks, security fences, walled-in product storage or a large dump of mill tailings is to be seen. The mine product, which forms a small fraction of the ores, is shipped away for further treatment elsewhere. The mineral product is believed to be of high tonnage value. The miners are able to devote their full attention to mining, as there is a general absence of gardens near the housing areas. The mines and prospects lack the appearances of crash priority operations. The slopes about the mines appear to be grazed as if by flocks, possibly kept to provide milk and meat for the miners engaged in hard underground labor on unhealthful ores.